#1 OH
Notes

Scientific Notation

1) It is a short way of writing long numbers. (Without lots of zeros or placevalues)

2) It works because each place value to the left is 10x larger than the one before it
   a. 1000 is the same as 10x10x10 or 10^3
   b. 5000 is the same as 5x1000 or 5x10x10x10 or 5x10^3

3) To put a large number into notation form, move the decimal to the left
   a. Stop when there is only one number left before the decimal.
   b. Count up the number of places the decimal moved.
   c. That number becomes the exponent.

* exponent can be positive or negative
  + = whole #
  − = decimal
  0 = coefficient

4) To put a very small number into notation, move teh decimal to the right.
   a. Stop when you pass the first nonzero number.
   b. Count the places you moved the decimal.
   c. That becomes your exponent, but it is negative.

5) Multiplying with notation:
   a. Multiply the coefficients and add the powers.

6) Dividing with notation:
   a. Divide the top coefficient by the bottom one.
   b. Subtract the bottom exponent from the top exponent.

2.1 Exponent is used to communicate the # of place values for a given coefficient

4.5×10^{9} ← Exponent $= 4,500,000,000$

4.5: coefficient; 10: base

* Coefficient should always be written w/ one non-zero digit in the one's place (to the left of the decimal point).

#2 OH

Scientific Notation

Introduction:

Values that are used in scientific calculations can be very large or very small. One way to make these numbers more manageable for calculation is to use scientific notation for calculation. In scientific notation, a value is expressed as a number between one and ten, multiplied by a power of ten (in exponent form).

Putting numbers into notation:

Numbers are put into or out of notation by moving the decimal to the left or the right until there is only one non-zero digit to the left of the decimal.

Example 1: one light year is 9,500,000,000,000 kilometers. In scientific notation form, this would be written as 9.5×10^{12} kilometers.

Example 2: one angstrom is .0000000001 meters. In scientific notation form, this is written as 1.0×10^{-10} meters.

Example 3: 1.49×10^{8} km represents the value 149,000,000 km.

Example 4: 6.67×10^{-8} dynes represents the value .0000000667 dynes

Complete these examples by putting these numbers into normal non-notation form.

Think of these as 1s.

$1 \times 10^{0}=$

$1 \times 10^{-1}=$

$1 \times 10^{1}=$

$10^{-2}=$

$10^{2}=$

$2.3 \times 10^{-3}=$

$9.07 \times 10^{3}=$

$.00315 \times 10^{5}=$

$8.374 \times 10^{-7}=$

$6.1734 \times 10^{9}=$

Put the following numbers into scientific notation.

136,000,000=

98,200,000,000=

.000007118=

607,000,000,000=

.000000000378=

.001000045=

#3 OH

Multiplication in Scientific Notation

When multiplying in notation, the powers are added and the coefficients are multiplied.

Example: 3.4×10^6 times $2.1 \times 10^3 = 7.14 \times 10^9$

Multiply the following numbers.

$1.4 \times 10^6 \times 2.6 \times 10^8 =$

$9.1 \times 10^4 \times 7.3 \times 10^6 =$

$12.6 \times 10^7 \times 4.21 \times 10^{-3} =$

$6.34 \times 10^5 \times 1.15 \times 10^9 =$

Division in Scientific Notation

When dividing in notation, the bottom coefficient is divided into the top coefficient. Then the bottom exponent is subtracted from the top exponent.

Example: $\frac{4.2 \times 10^8}{1.4 \times 10^2} = 3 \times 10^6$

$\frac{1.82 \times 10^7}{1.3 \times 10^4} =$

$\frac{4.16 \times 10^9}{2.4 \times 10^3} =$

$\frac{6.88 \times 10^6}{3.1 \times 10^{-2}} =$

$\frac{5.12 \times 10^{11}}{2.8 \times 10^3} =$

$\frac{5.29 \times 10^7}{2.3 \times 10^{12}} =$

$\frac{6.48 \times 10^{-5}}{2.4 \times 10^{-8}} =$

Homework #4

Scientific Notation Practice Problems

1. Convert the following numbers to correct scientific notation.

   a. 4,600

   b. 0.00067

   c. 780

   d. 867,530.9

   e. 0.00000000001900

   f. 0.00000000361

   g. 62,000,000,000,000,000,000

   h. 0.000000000000000000021

   i. 3487×10^{3}

   j. 0.0029×10^{5}

   k. 4650×10^{-3}

   l. 0.0450×10^{-7}

2. Convert the following scientific notations to normal numbers.

   a. 6.54×10^{3}

   b. 8.2×10^{-8}

   c. 5.1×10^{5}

   d. 8.6×10^{-2}

   e. 7.8×10^{-4}

   f. 6.69×10^{3}

   g. 7.55×10^{-3}

   h. 3.90×10^{7}

   i. 1.265×10^{-10}

   j. 8.56×10^{12}

   k. 5.2366×10^{2}

   l. 7.673×10^{6}

Homework #5

3. Perform the following calculations. Report your answers to the ~~correct number of significant figures.~~ hundredth.

   a. $(1.023 \times 10^{5}) \times (2.15 \times 10^{4})$

   b. $(1.02 \times 10^{2}) \times (5.5 \times 10^{-2})$

   c. $(6.3 \times 10^{-10}) \times (8.51 \times 10^{12})$

   d. $(7.3031 \times 10^{6}) / (5.069 \times 10^{6})$

   e. $(3.0345 \times 10^{4}) / (6.05 \times 10^{7})$

   f. $(6.0 \times 10^{4}) \times (3.7 \times 10^{-2})$

   g. $(7.082 \times 10^{-3}) / (4.09 \times 10^{-5})$

#6 OH

Period: Date: Name:

Scientific Notation Worksheet

Convert the following numbers into scientific notation:

1) 3,400 _____

2) 0.000023 _____

3) 101,000 _____

4) 0.010 _____

5) 45.01 _____

6) 1,000,000 _____

7) 0.00671 _____

8) 4.50 _____

Convert the following numbers into standard notation:

9) 2.30×10^{4} _____

10) 1.76×10^{-3} _____

11) 1.901×10^{-7} _____

12) 8.65×10^{-1} _____

13) 9.11×10^{3} _____

14) 5.40×10^{1} _____

15) 1.76×10^{0} _____

16) 7.4×10^{-5} _____

Show Work and Circle Answer!

17) $(9.45 \times 10^{-13})(2.1 \times 10^{3})$

18) $(2.8 \times 10^{11}) / (4.57 \times 10^{4})$